2022 ANNUAL INTEGRATED MANAGEMENT PLAN REPORT:

NEBRASKA DEPARTMENT OF NATURAL RESOURCES

&

UPPER NIOBRARA WHITE NATURAL RESOURCES DISTRICT

REPORTING ON 2021 DATA

ANNUAL MEETING HELD ON NOVEMBER 3, 2022

Purpose

This report fulfills the Department of Natural Resources' (Department or NeDNR) responsibilities as outlined in the Upper Niobrara White Natural Resources District (District or UNWNRD) integrated management plan (IMP) and provides updates on current projects and studies in the area.

Reporting and exchanging information gathered from monitoring projects, streamflow data, or other studies provides a basis for increased understanding of the hydrologically connected surface water and groundwater system. In areas where surface water and groundwater are hydrologically connected, estimates of water quantity of either surface water or groundwater cannot be evaluated separately. The data gathered through the IMP's monitoring plan and reported here are provided to assist evaluation of the success of the IMP's objectives. This information exchange also helps to test the validity of the conclusions and information upon which the IMP is based. This report contains information on variance activities and permit activities from January 1 through December 31, 2021. Also included are canal diversion and streamflow measurements from the 2021 water year, starting October 1, 2020, through September 30, 2021.

Department Reporting

The IMP requires that the Department annually report on the following surface water data within the district:

1. **Surface water permitting**
    a. Any order of cancellation issued pursuant to Neb. Rev. Stat. § 46-229.04(5) or any assignment of the right to use that portion of an appropriation which was relinquished.
    b. Variances granted by the Department, facts offered as justification for the variance to be granted and the reasons for the action taken. See **Appendix C** for full text of the Department of Natural Resources Rules of Surface Water, Title 457, Neb. Admin. Code, Chapter 23, concerning variances.

2. **Diversions**
    a. Records of surface water diversions collected by the Department upstream of the Box Butte Reservoir.
    b. Surface water pump site inspections conducted in 2021.

3. **Streamflow**
    a. Records of streamflow measurements taken from non-gaged streams within the District.

1. Surface Water Permitting

a. Any order of cancellation issued pursuant to Neb. Rev. Stat. § 46-229.04(5) or any assignment of the right to use that portion of an appropriation which was relinquished.

In 2021, the Department did not issue any orders of cancellation pursuant *Neb. Rev. Stat.* § 46-229.04(50). However, there were four temporary manufacturing (MF) permits for road construction that expired in 2021. Because these permits were located within the surface water control area, and therefore subject to a moratorium, they were issued under variances, which were reported in the Department's 2020 report. **Figure 1** shows the surface water control area and the location of all surface water permitting actions in 2021. **Table 1** provides a summary the expired MF permits and their associated variances.

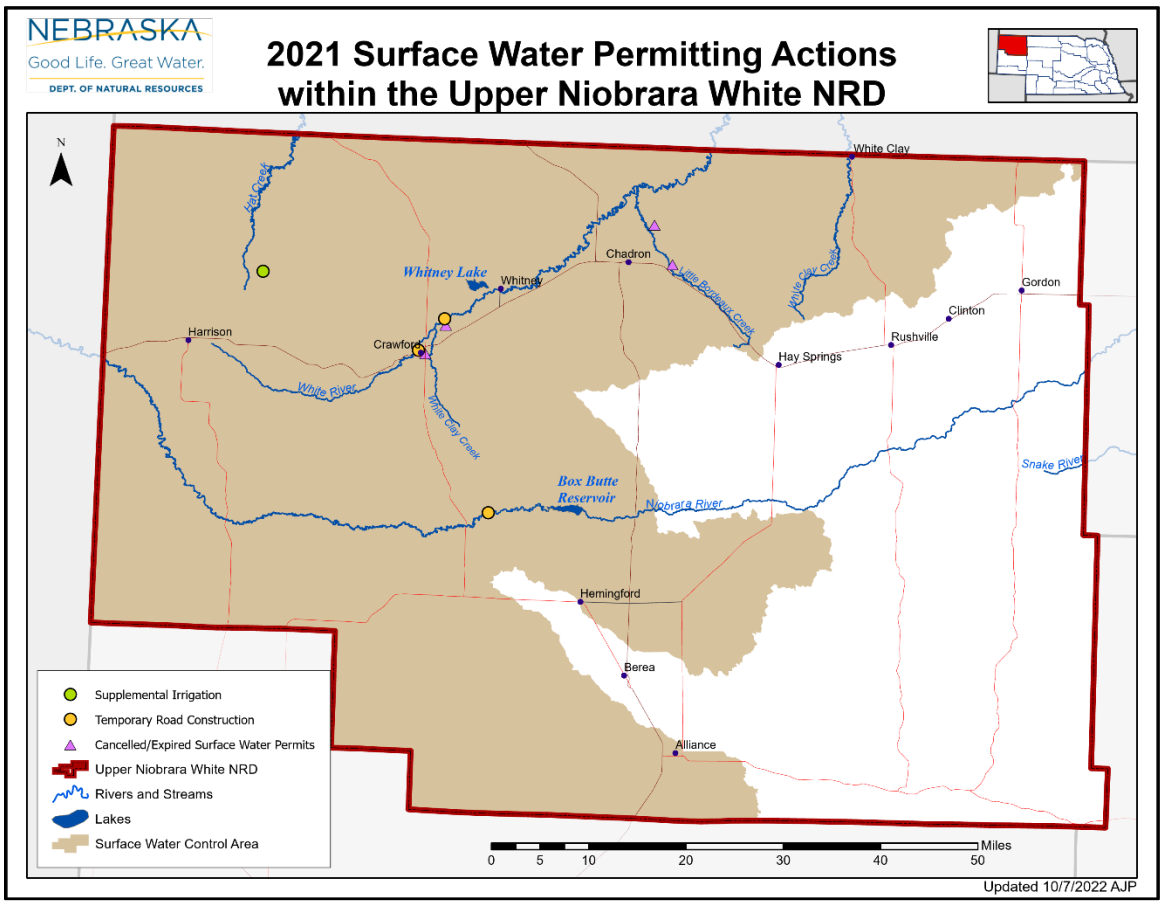


Figure 1: *2021 surface water permitting actions within UNWNRD*

b. Variances granted by the Department, facts offered as justification for the variance to be granted and the reasons for the action taken.

In 2021, the Department granted four variances for surface water permits within the surface water control area. This process has two steps, first a petitioner must file a request for leave, if a variance is granted, the petitioner then has one year from NeDNR's order to file an application for a permit to appropriate water.

VAR-7538 was filed in December of 2020 and granted in 2021. This variance allowed for a new supplemental irrigation (SI) permit to apply a maximum of 42 acre feet of water stored in Wickersham Reservoir to 127 acres already covered by an existing natural flow appropriation.

VAR-9393, VAR-9394, and VAR-9395, allowed for temporary MF permits to be issued for road construction. These temporary permits are set to automatically expire one year from the date they are issued. **Table 2** summarizes the variances granted in 2021.

Table 1: *Summary of surface water permits that expired or were cancelled in 2021.*

Appropriation Number	Approval Date	Expiration Date	Point of Diversion Location				Use	Source	Name of Reservoir	Grant in CFS	Grant in AF	Variance Petition Basis	Associated Variance
			Sec	Twn	Rng	Dir							
A-19704	5/14/2020	5/14/2021	13	33	48	W	Temporary Road Construction	Bordeaux Creek, Little	NA	NA	10	Variance granted pursuant to 457 Neb. Admin. Code Ch. 23 § 001.06	VAR-8917
A-19705	5/14/2020	5/14/2021	27	34	48	W	Temporary Road Construction	Bordeaux Creek	NA	NA	10	Variance granted pursuant to 457 Neb. Admin. Code Ch. 23 § 001.06	VAR-8918
A-19706	5/14/2020	5/14/2021	3	31	52	W	Temporary Road Construction	White River	NA	NA	10	Variance granted pursuant to 457 Neb. Admin. Code Ch. 23 § 001.06	VAR-8919
A-19707	5/14/2020	5/14/2021	24	32	52	W	Temporary Road Construction	White River	NA	NA	10	Variance granted pursuant to 457 Neb. Admin. Code Ch. 23 § 001.06	VAR-8920

Table 2: *Variances and associate applications acted upon in 2021 within the Upper Niobrara White NRD*

Appropriation Number	Approval Date	Point of Diversion Location				Use	Source	Name of Reservoir	Grant	Variance Petition Basis	Associated Variance
		Sec	Twn	Rng	Dir						
A-19751	7/26/2021	31	33	54	W	Supplemental Irrigation from reservoir on lands already covered by a natural flow appropriation	NA	Wickersham Reservoir	42 AF	Variance granted pursuant to 457 Neb. Admin. Code Ch. 23 § 001.04	VAR-7538
A-19784	8/4/2021	35	29	51	W	Temporary Road Construction	Niobrara River	NA	10 CFS	Variance granted pursuant to 457 Neb. Admin. Code Ch. 23 § 001.04	VAR-9393
A-19785	8/4/2021	3	31	52	W	Temporary Road Construction	White River	NA	10 CFS	Variance granted pursuant to 457 Neb. Admin. Code Ch. 23 § 001.04	VAR-9394
A-19786	8/4/2021	24	32	52	W	Temporary Road Construction	White River	NA	10 CFS	Variance granted pursuant to 457 Neb. Admin. Code Ch. 23 § 001.04	VAR-9395

2. Diversions

a. Records of surface water diversions collected by the Department upstream of the Box Butte Reservoir

Surface water diversion records for 2021 are included in **Appendix A**, and their locations are shown in **Figure 2.** The canals measured include the following: Bennett-Kay Canal, Cook Canal No. 1, Earnest Canal (North), Earnest Canal (South), Excelsior Canal, Geo. Hitshew Canal, Harris-Neece Canal, Hughes Canal, Johnson Canal, Labelle Canal, Lakotah Canal, McGinley-Stover Canal, McLaughlin Canal, Mettlen Canal, Moore-Kay Canal, and the Pioneer Canal.

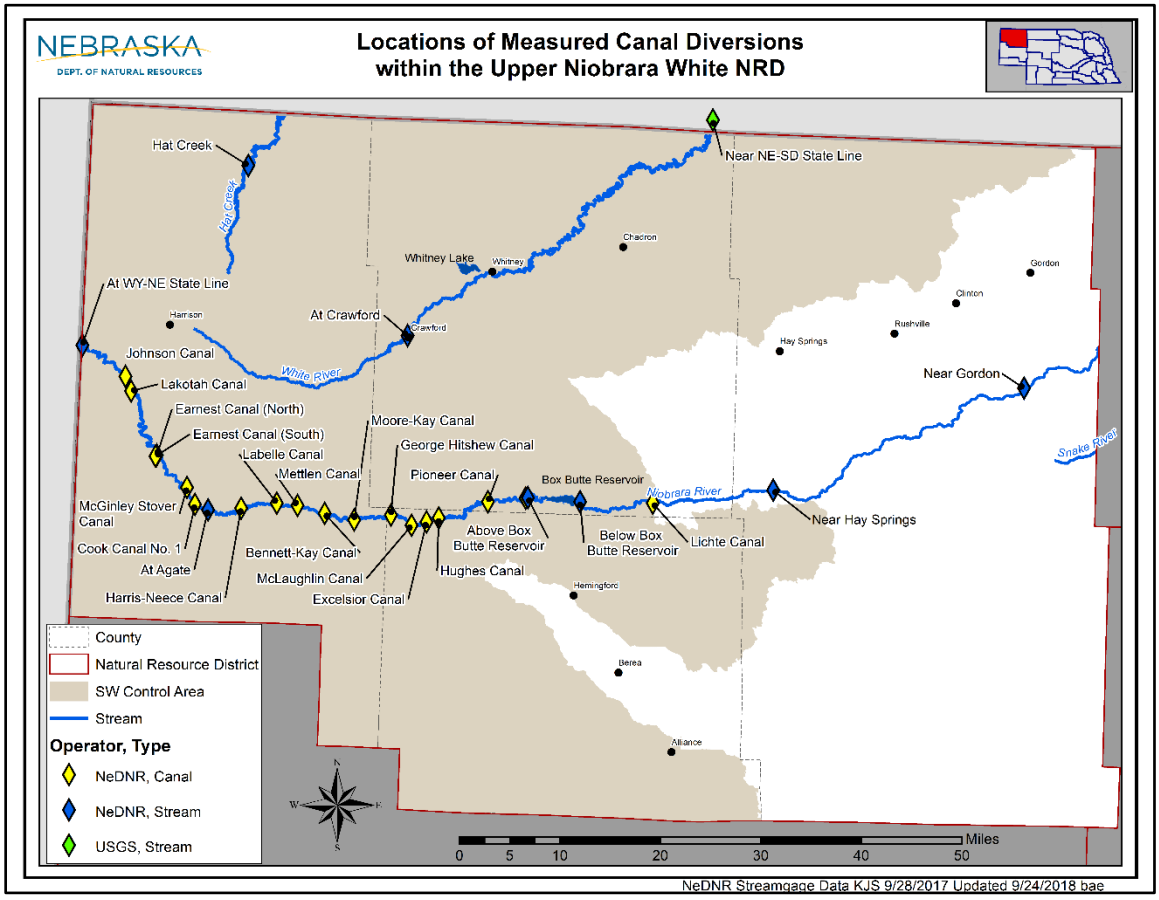


Figure 2: *Locations of gaged measurements included in Appendix A.*

b. Surface water pump site inspections conducted in 2021.

The NeDNR field office staff regularly inspects pump sites of surface water diversion points as conditions allow. Not all pump sites are inspected every irrigation season, and some pump sites may be visited more than once per season. In 2021, field office staff made 147 pump site inspections (**Figure 3**), this is in addition to the field measurements

of diversions into canals (**Appendix B**), in the UNWNRD. As a part of inspections, field staff collect the following data:

- Evidence of pump site
- Pumps that are running
- Crops in field
- Irrigation method

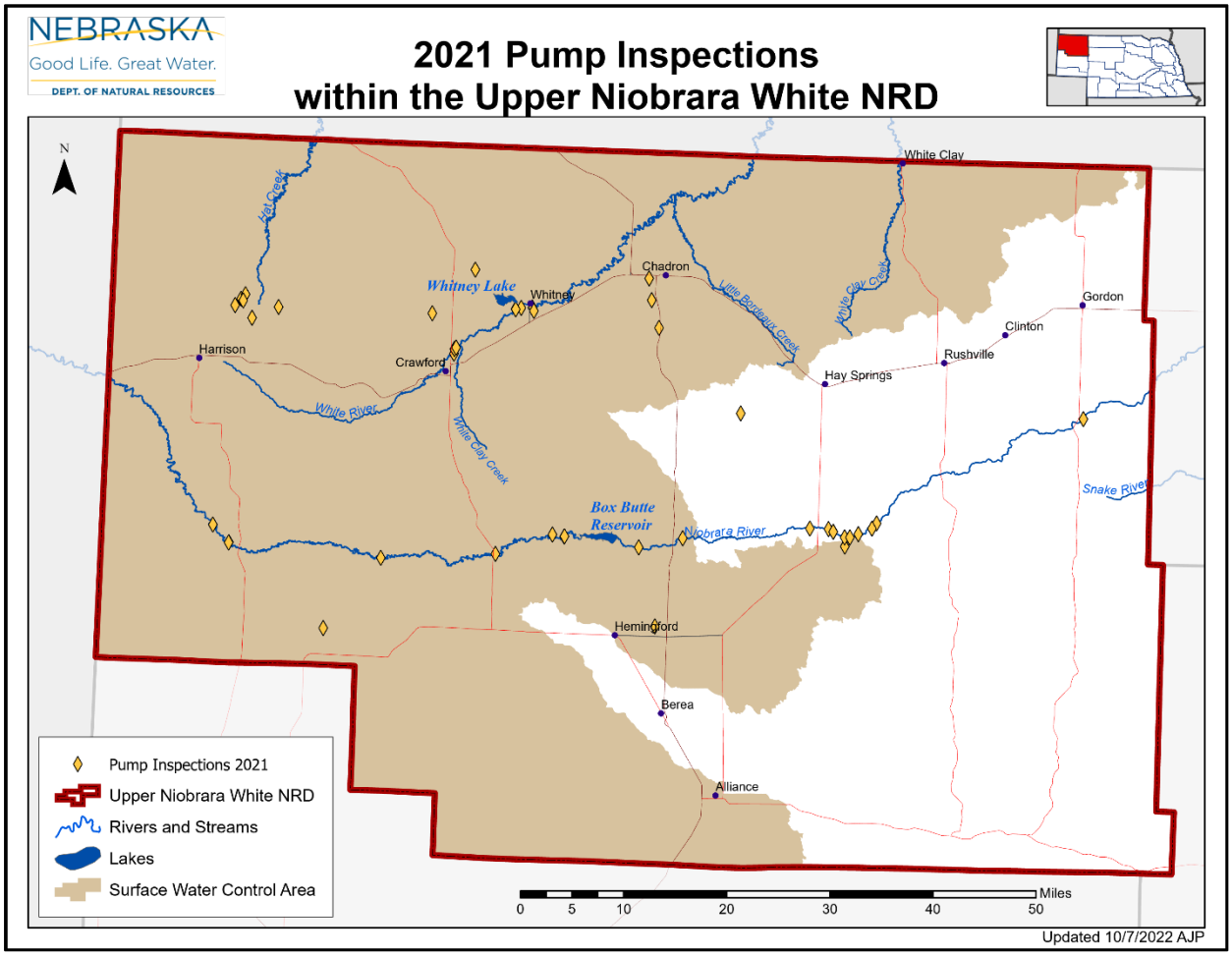


Figure 3: *Pump site inspections conducted in 2021*

3. Streamflow

Non-gaged stream locations, pumpsite, and reservoir measurements for calendar year 2021 are included in **Appendix B**. Streamflow measurements for gaged streams may be found at: https://nednr.nebraska.gov/RealTime/

Current Studies

USGS Niobrara Basin Model

The Department began working with the National Park Service and U.S. Geological Survey in 2020 to develop and calibrate a numerical groundwater model for most of the Niobrara basin in Nebraska, including a portion of the District. Calibration and documentation of the numerical model is expected to be completed in 2022. Currently the model is on track to be published in early of 2023.

UNWNRD Groundwater Modeling (Upper Niobrara White Groundwater Model)

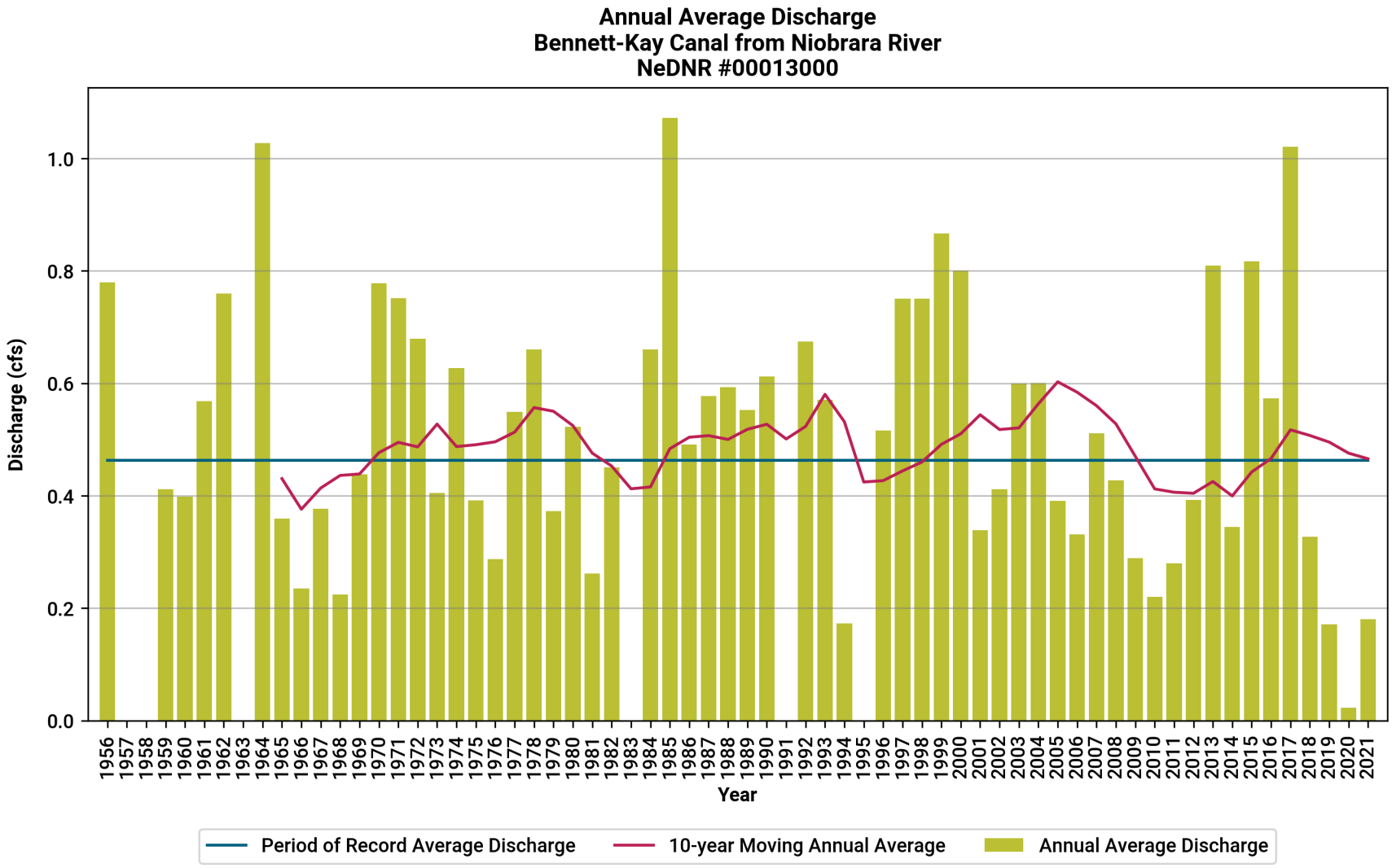
At the 2022 Nebraska Assoiciation of Resources Disctricts (NARD) Annual Conference, NeDNR and UNWNRD staff met to discuss progress on a study to better understand surface water and groundwater interaction in the District. At the meeting, the Department shared preliminary findings of the study, which used the Upper Nibrara White groundwater model and INSIGHT data, to answer the following questions.

- How has surface and groundwater irrigation impacted streamflow in the Niobrara River?
- What portion of that impact is attributed to groundwater irrigation?
- What is the long terms flow trend for the Niobrara River based on the current level of surface and ground water irrigation? Specifically**,** based on 2021 (under 2011, 2012, and 2015 climate conditions) developed acres and average water use.
- Would an allocation result in increased stream flow in the Niobrara River and if so, what would the impact be?
- Would surface water adjudication result in an increase in stream baseflow and if so, what would the impact be? (This could not be modeled)
- What would it take to cause a 6-foot drawdown in Subarea 5?

Review of the study is underway and expected to be complete by the end of 2022.

The department recognizes that there are limitations to the study due to the age of the model, which was last updated in 2018. These questions can be answered more completely by updating the model to use MODFLOW 6 and input data through 2021.

APPENDIX A AVERAGE ANNUAL CANAL DISCHARGE



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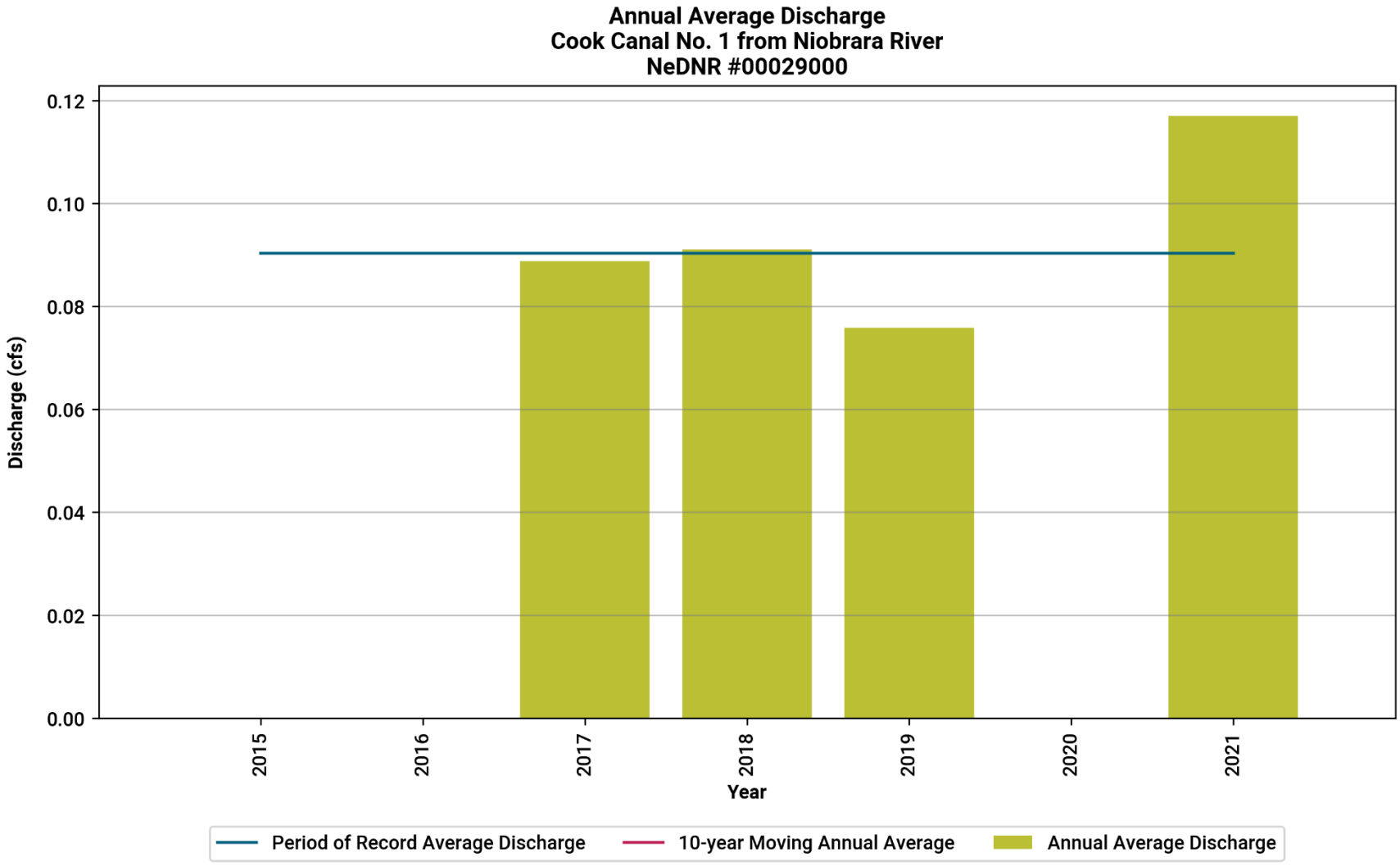

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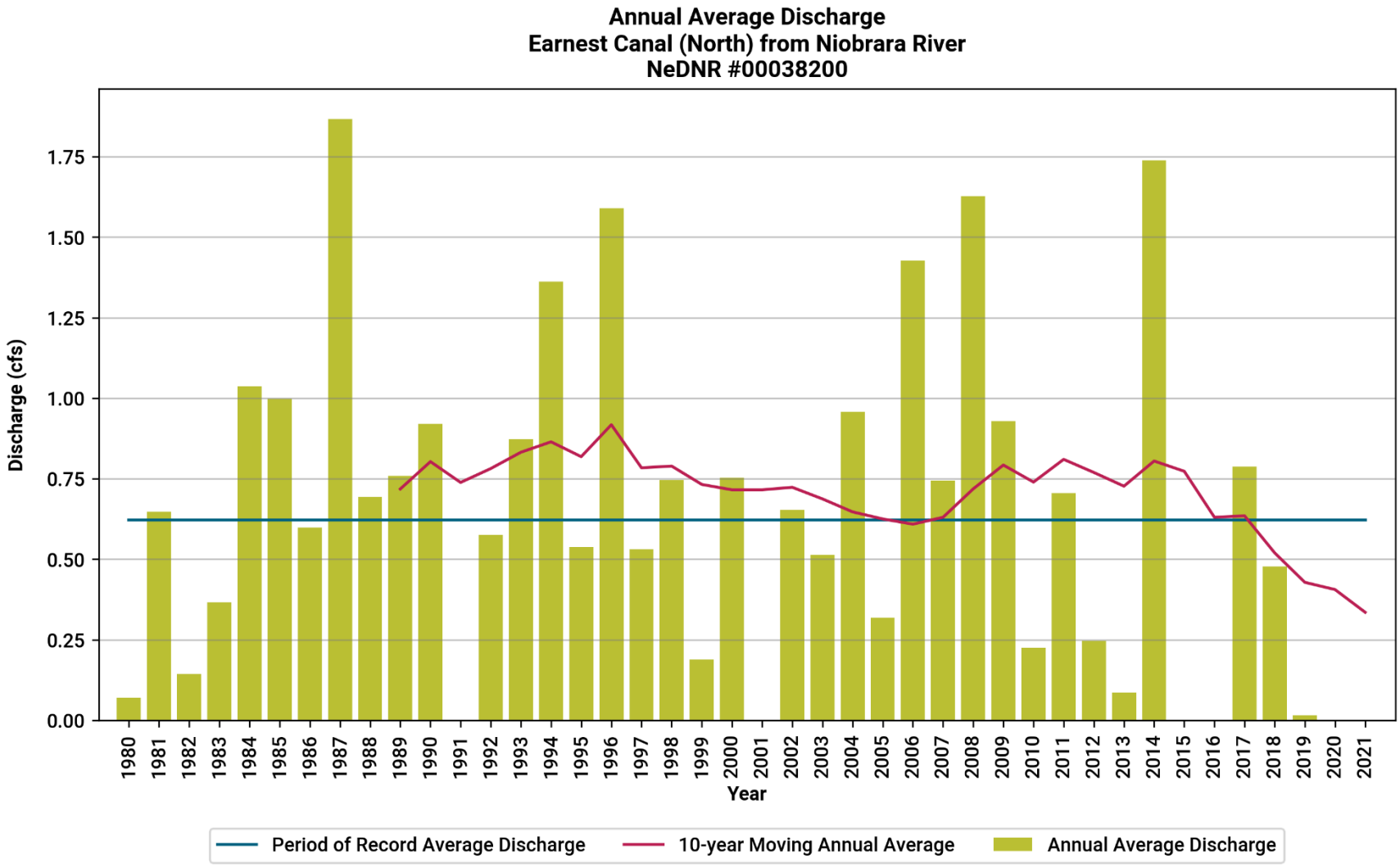

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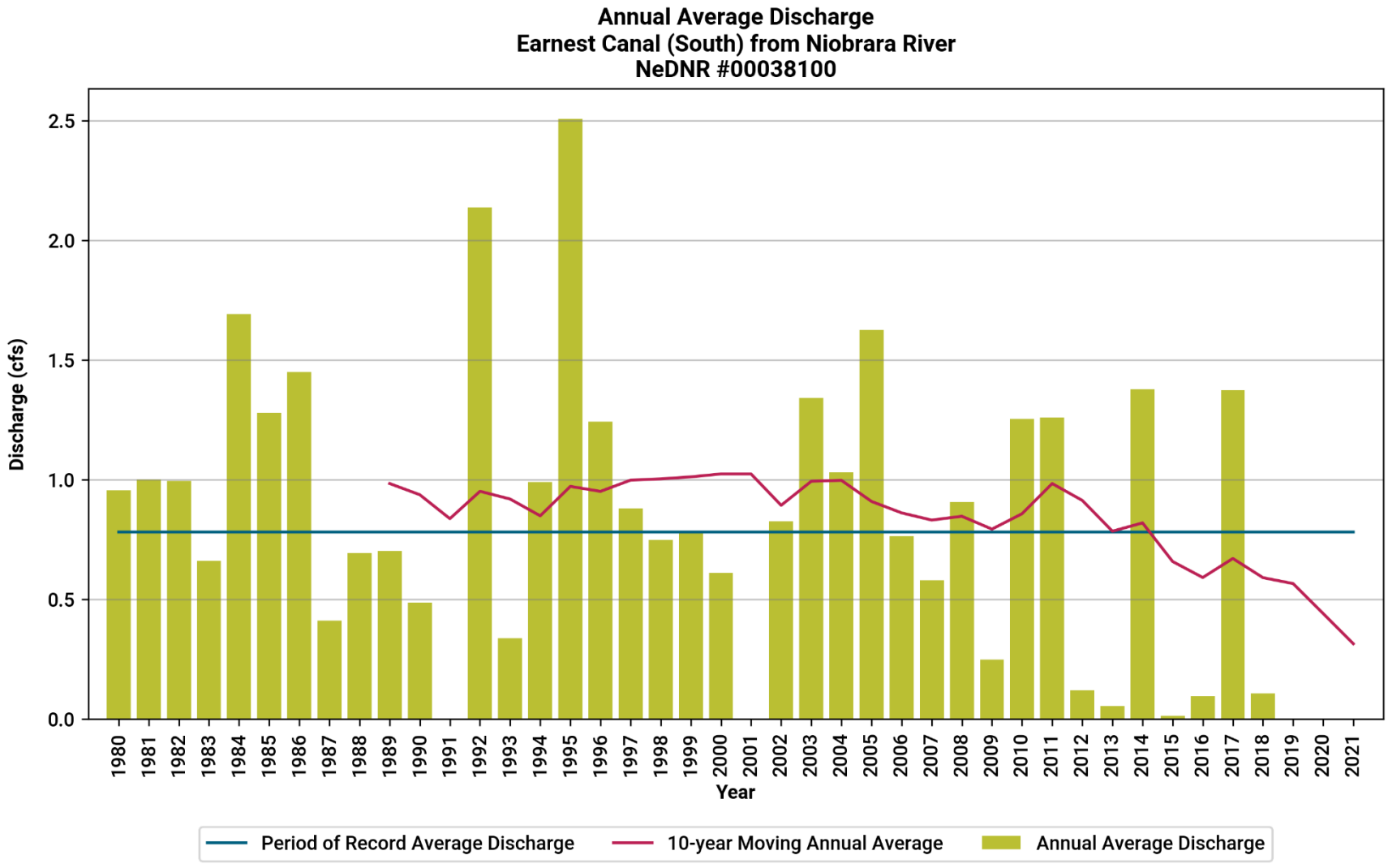

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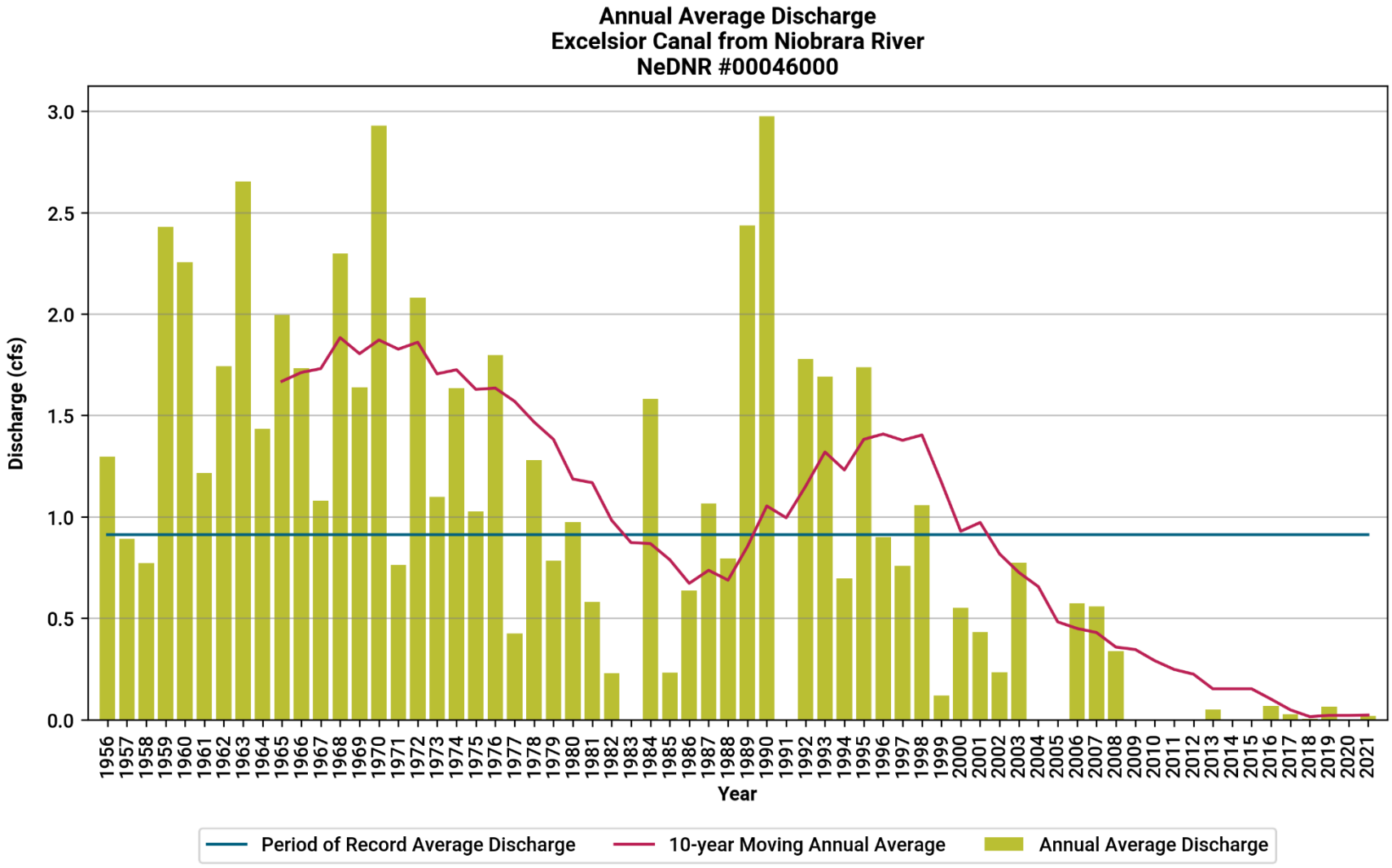

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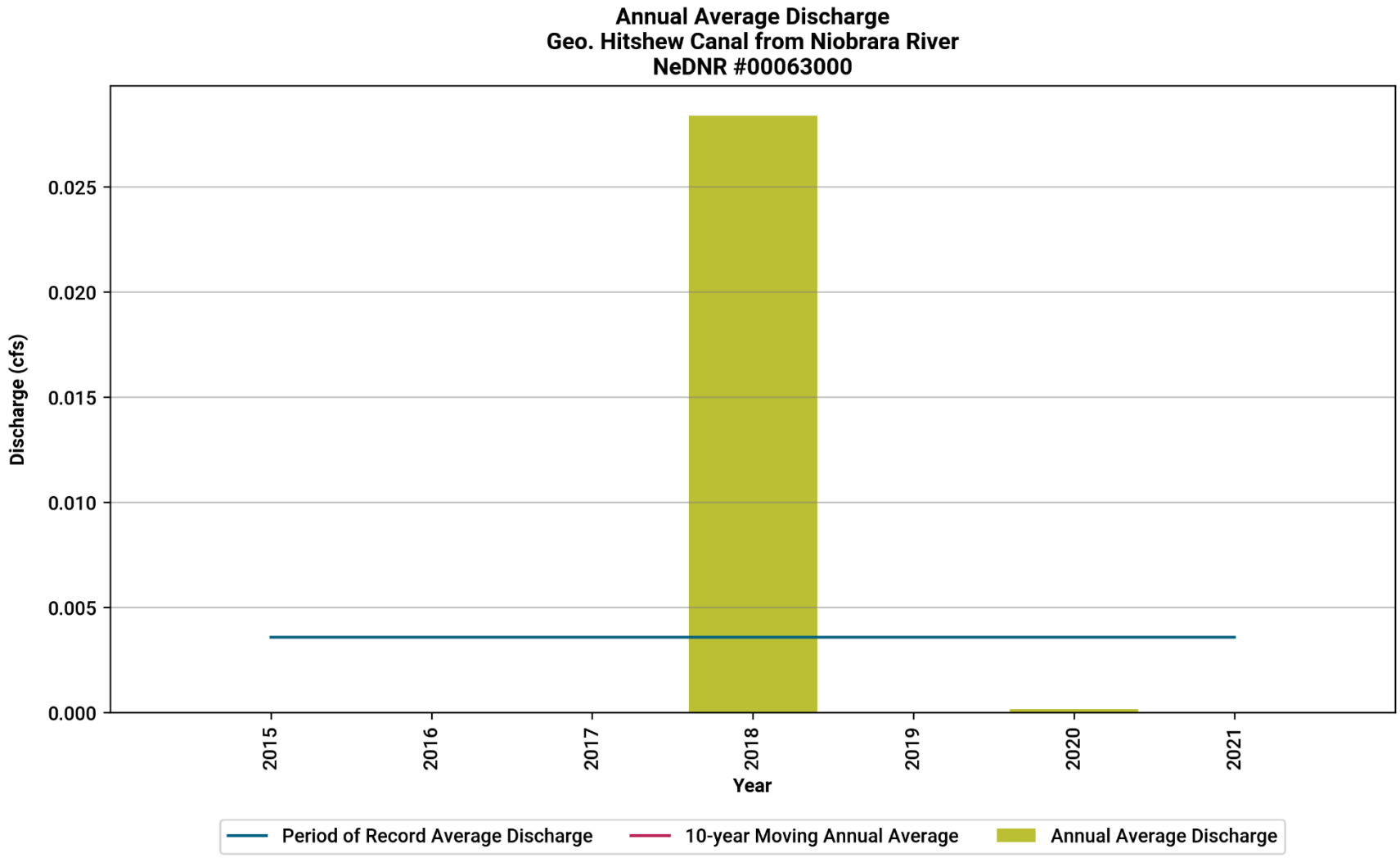

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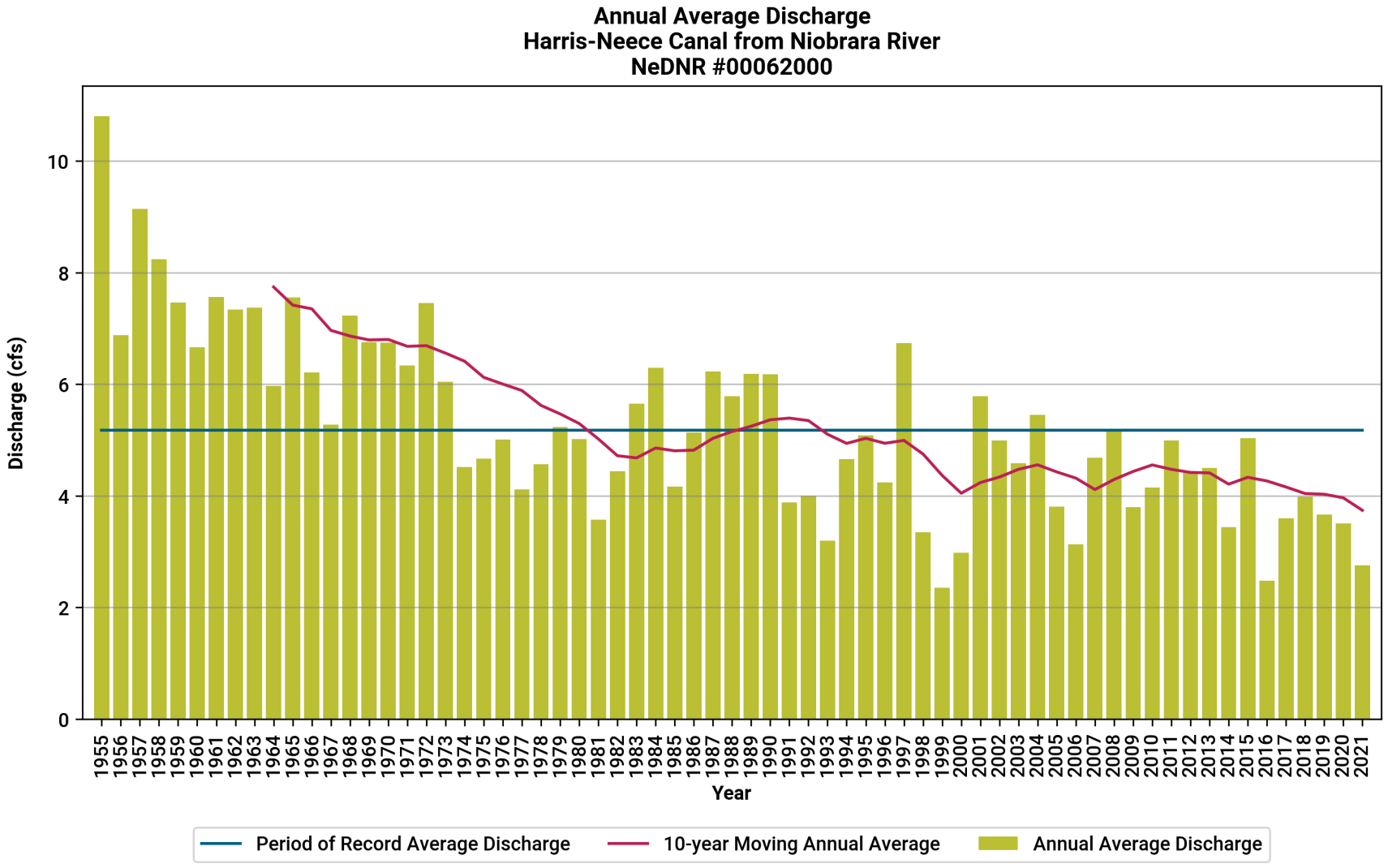

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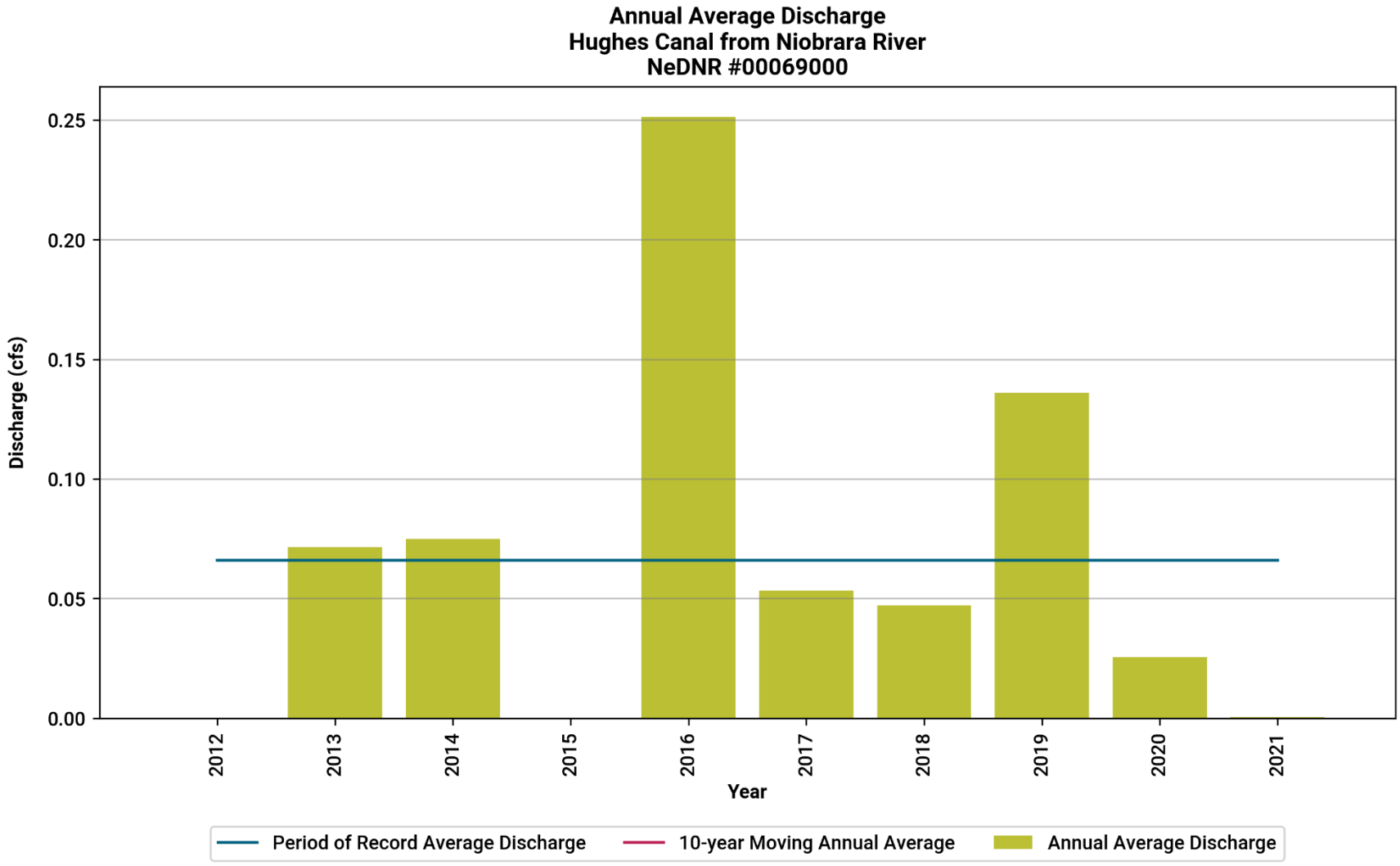

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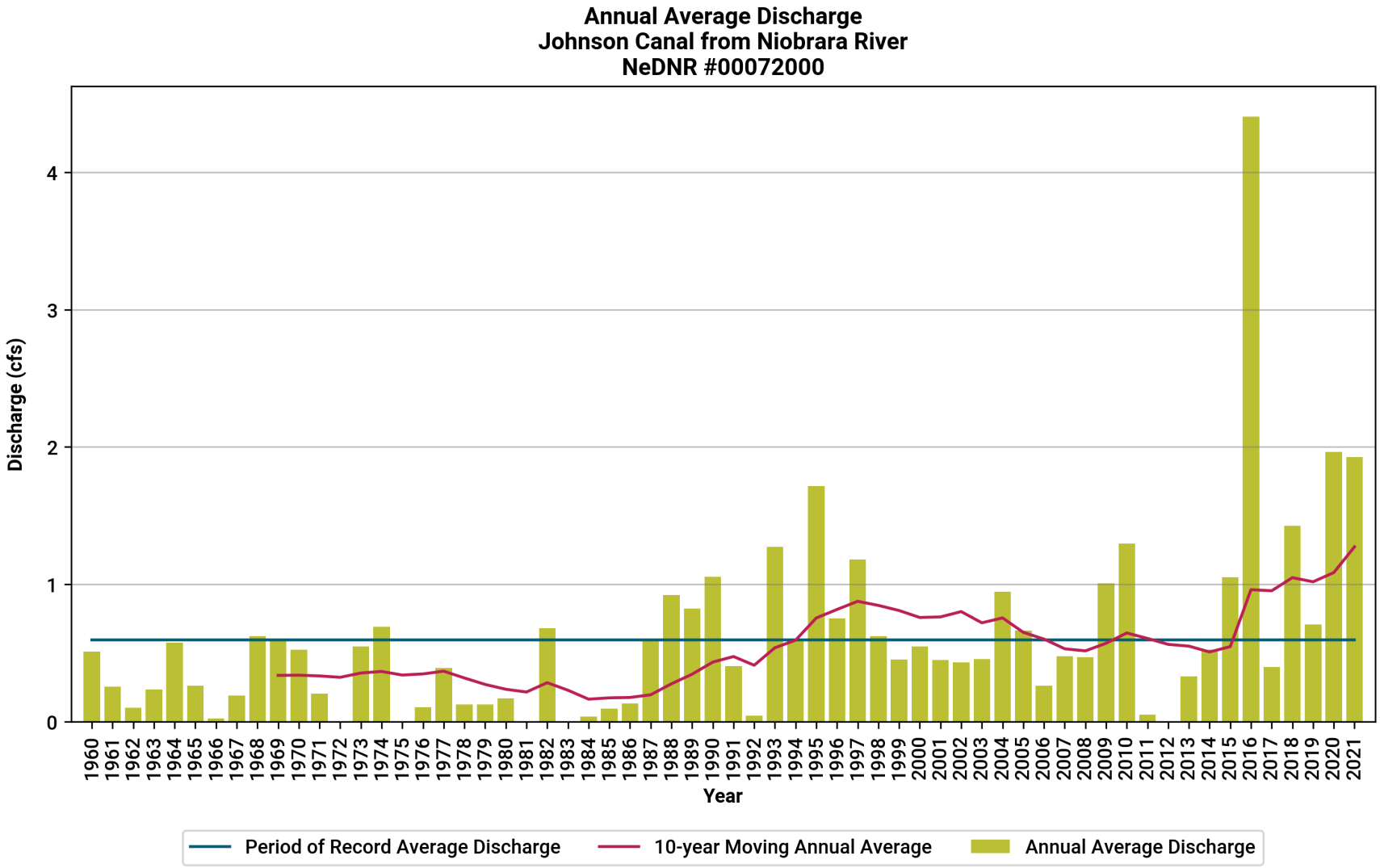

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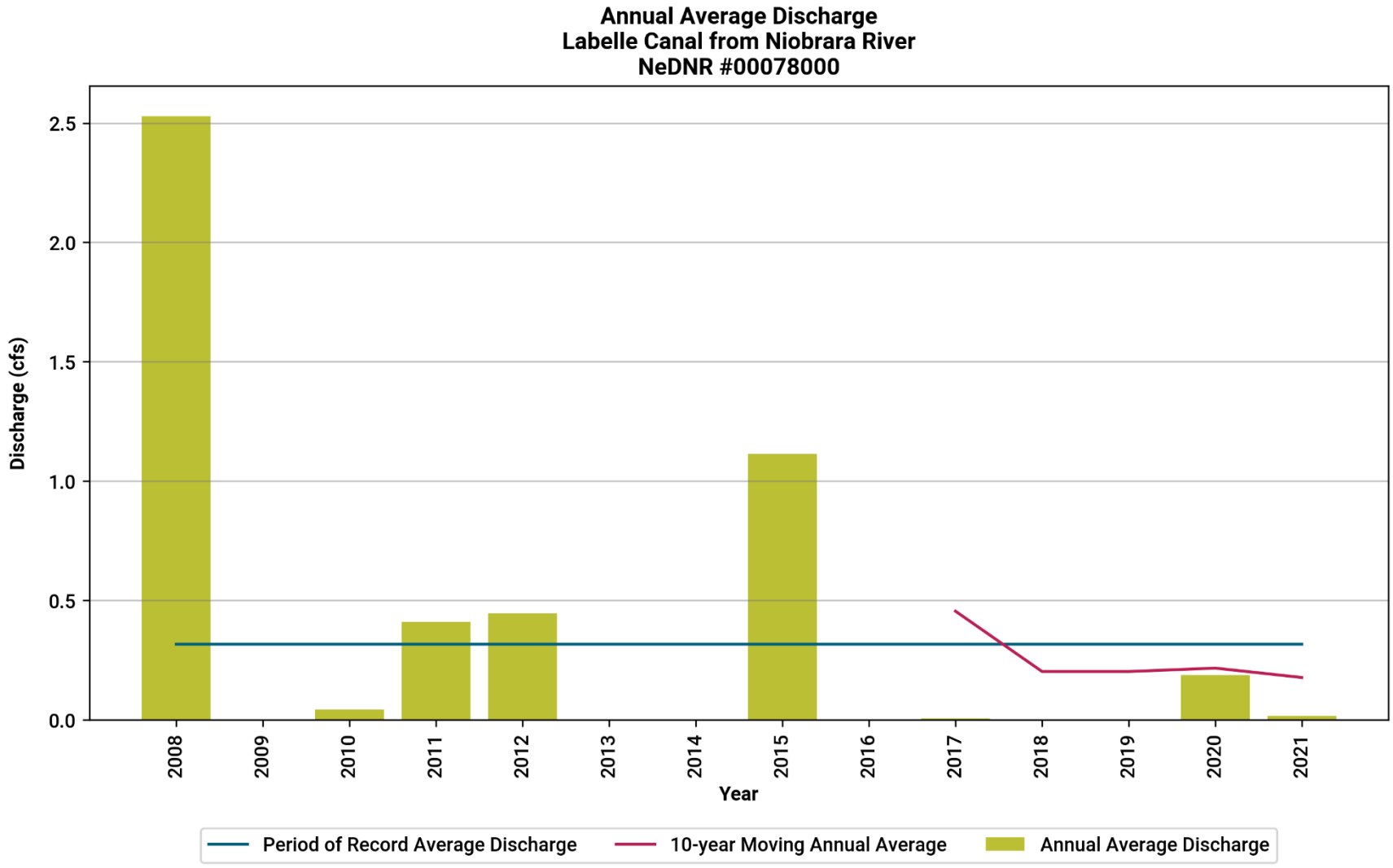

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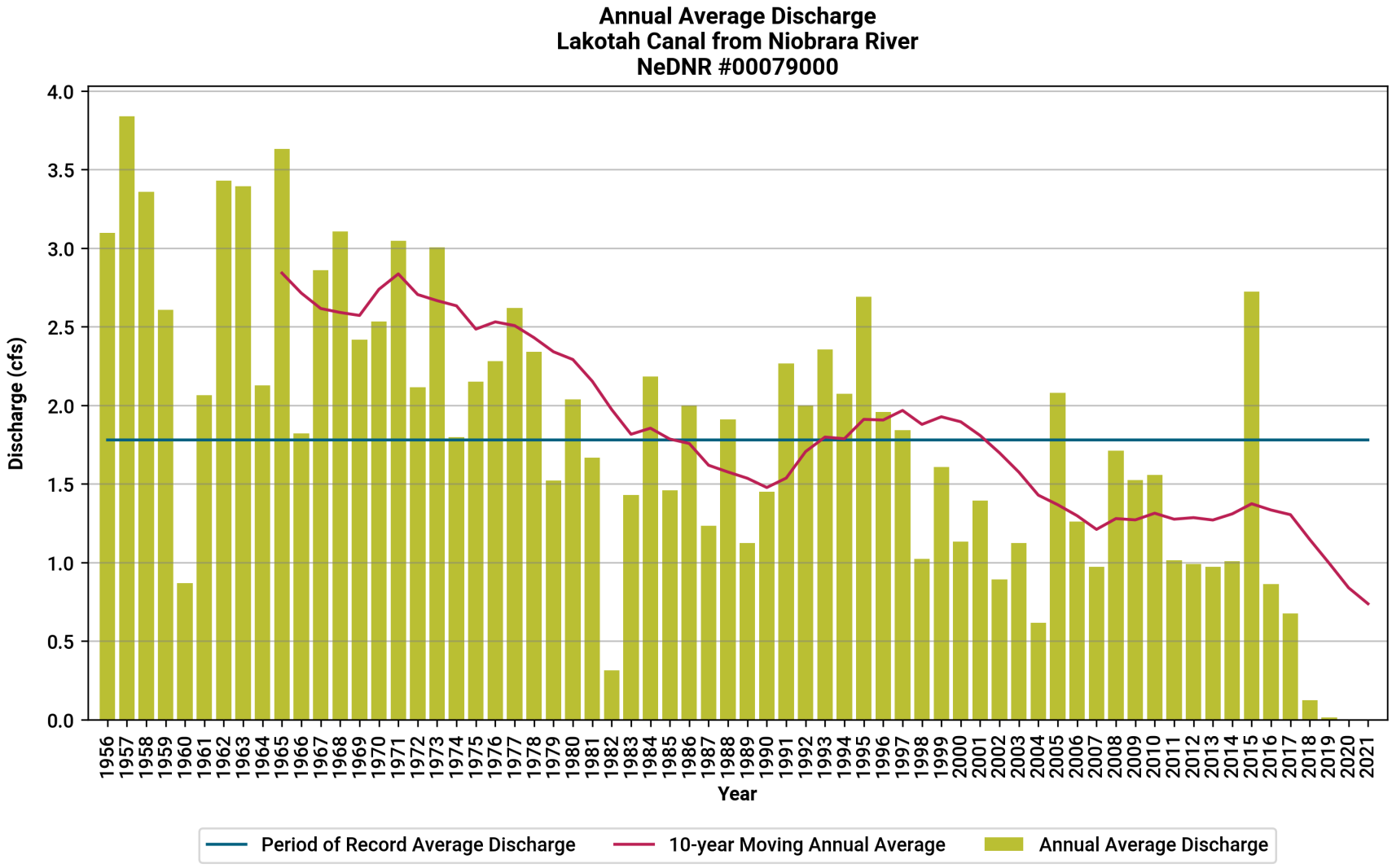

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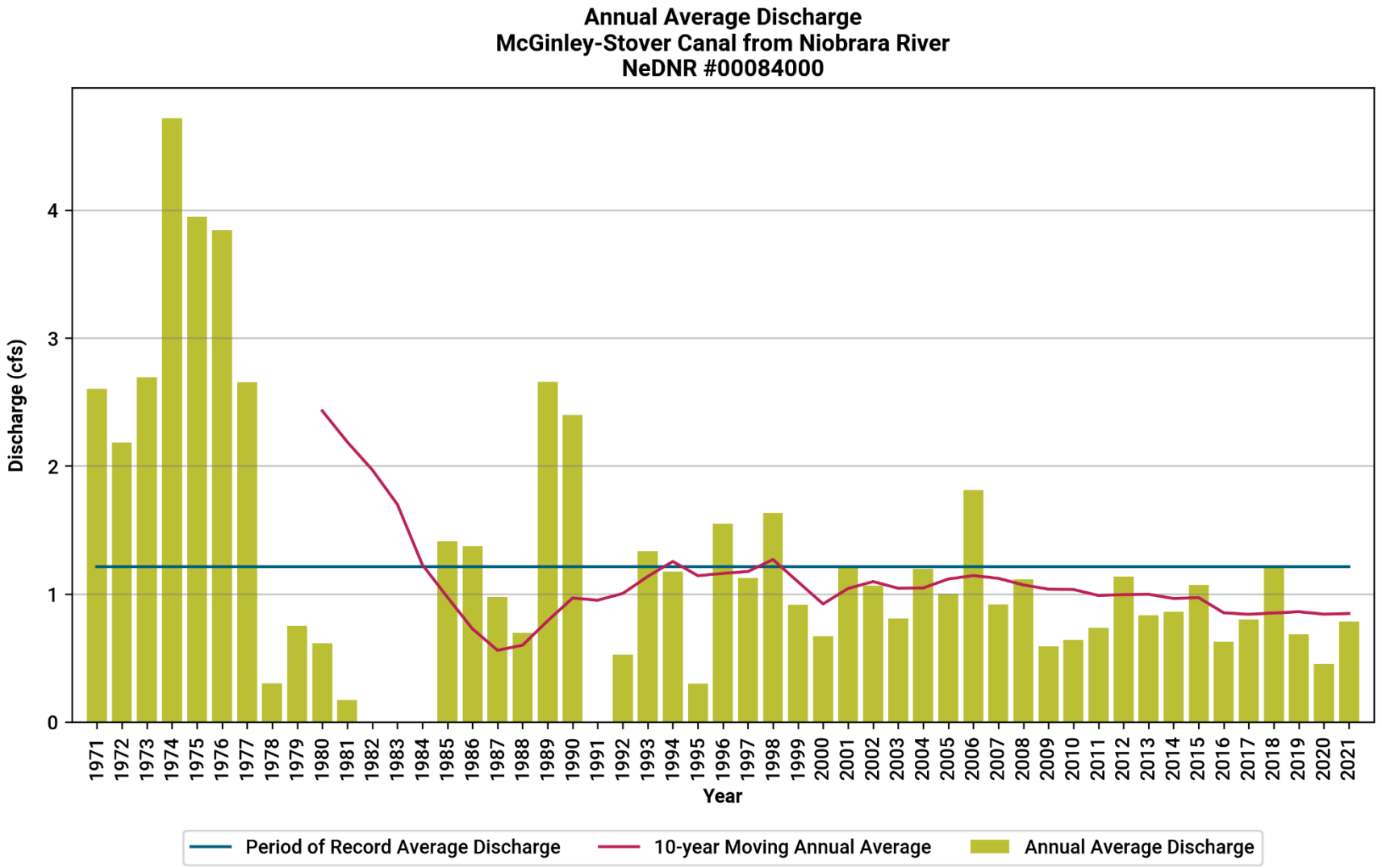

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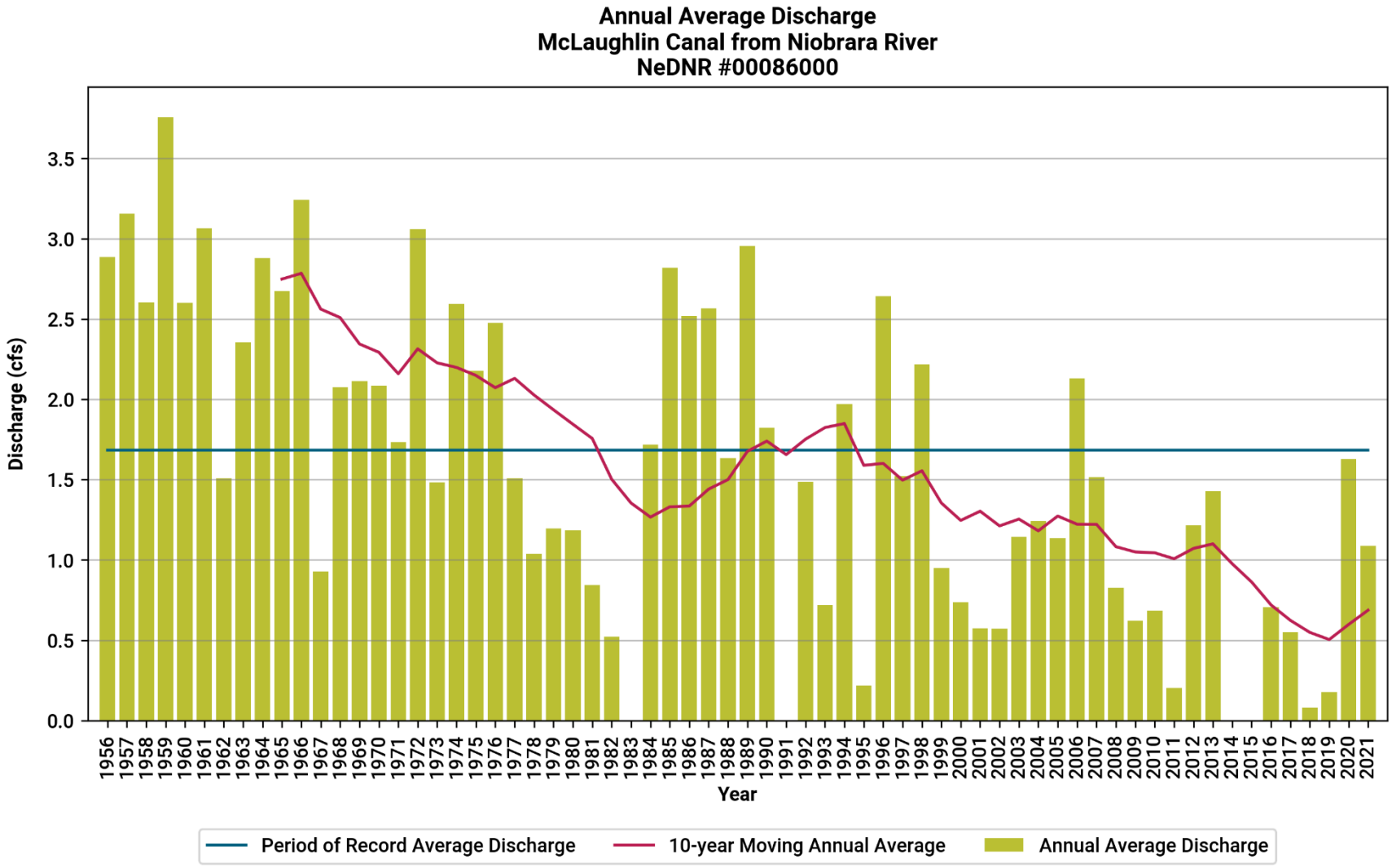

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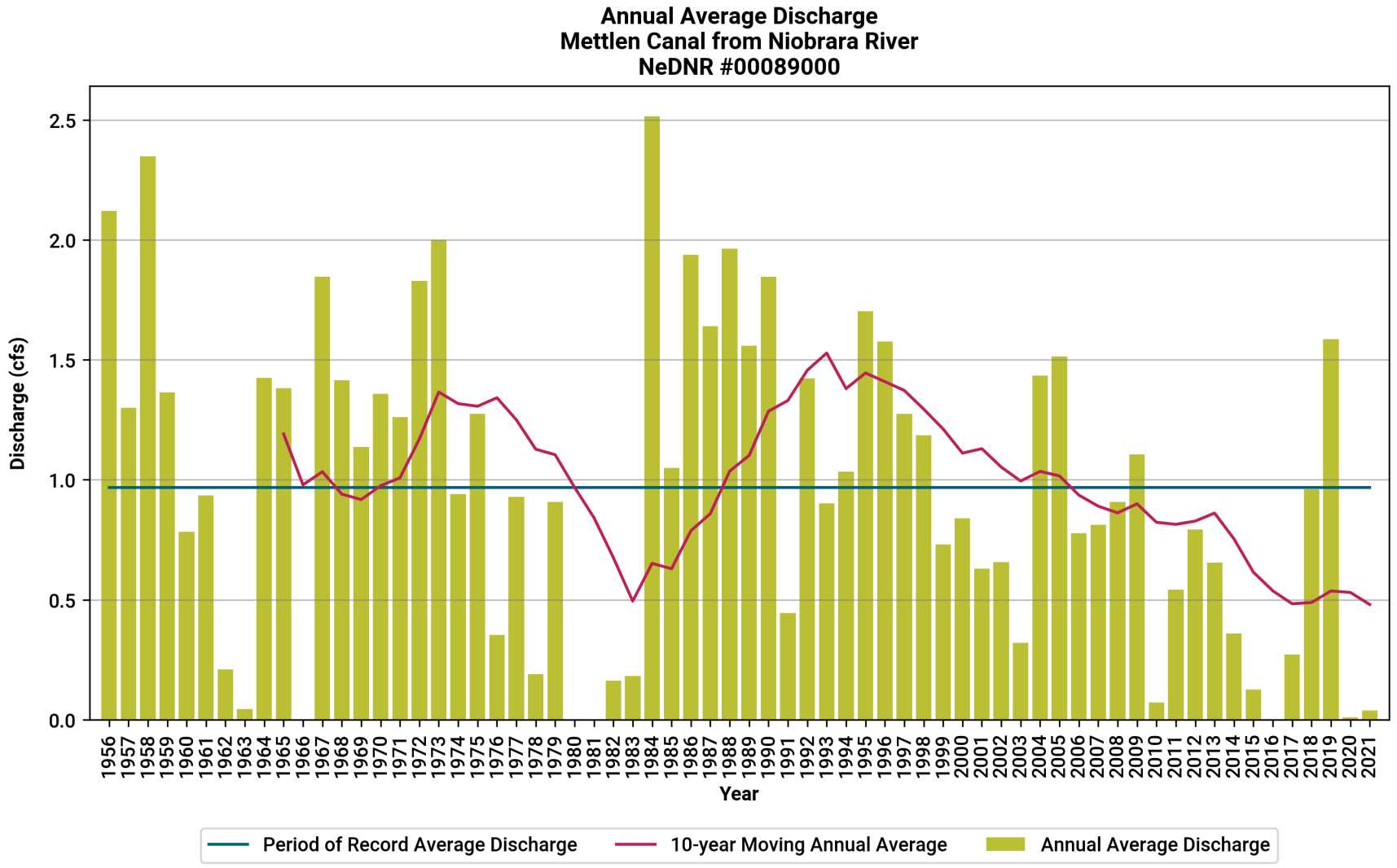

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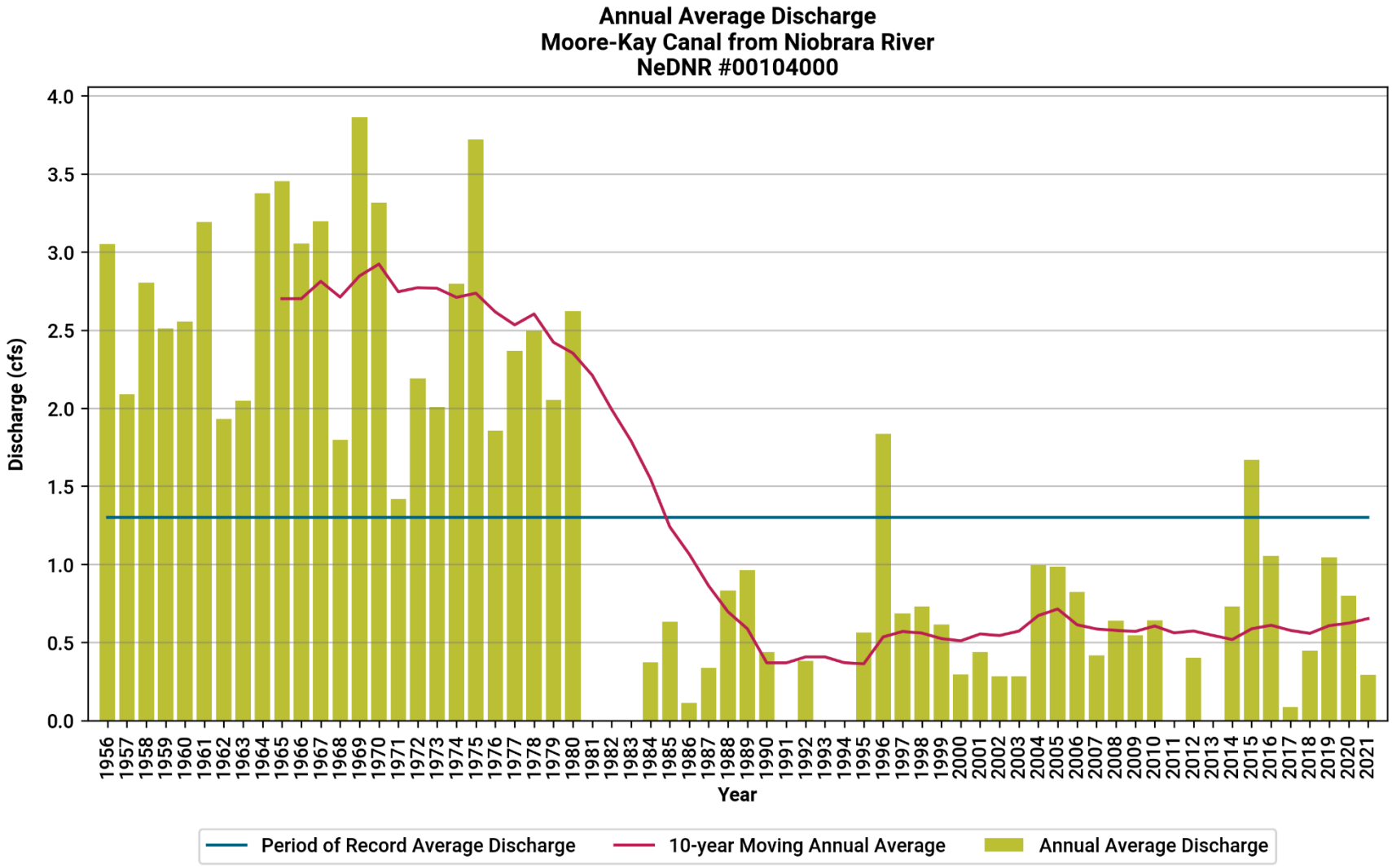

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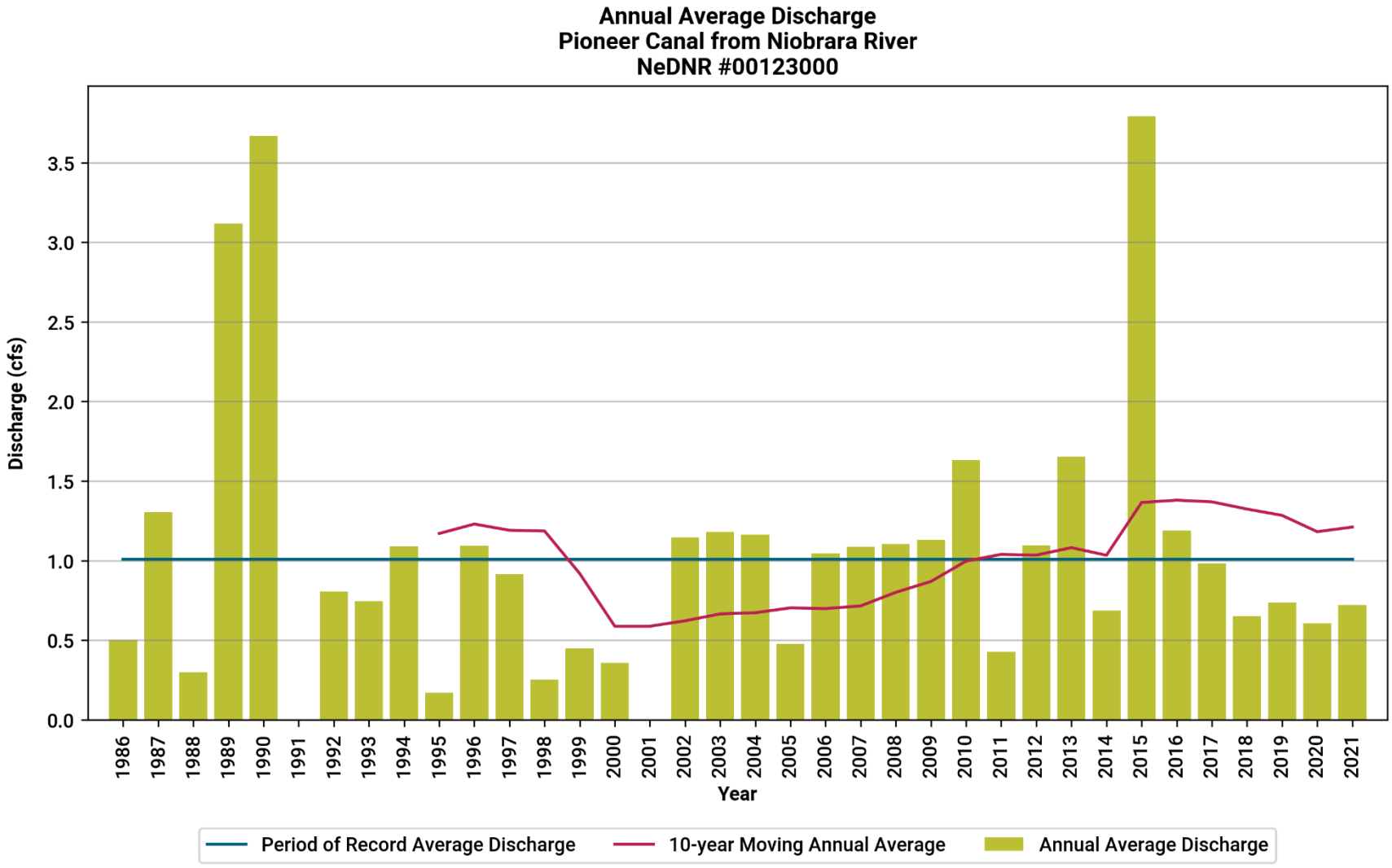

APPENDIX B 2021 FIELD MEASUREMENTS

Date	Site Name	Discharge/Volume	Unit
11/23/2021	Antelope Creek near Montrose	0	CFS
1/29/2021	Armstrong Pump fr Niobrara River	0	CFS
2/25/2021	Armstrong Pump fr Niobrara River	0	CFS
3/29/2021	Armstrong Pump fr Niobrara River	0	CFS
4/2/2021	Armstrong Pump fr Niobrara River	0	CFS
4/20/2021	Armstrong Pump fr Niobrara River	0	CFS
5/21/2021	Armstrong Pump fr Niobrara River	0	CFS
6/16/2021	Armstrong Pump fr Niobrara River	0	CFS
7/13/2021	Armstrong Pump fr Niobrara River	0	CFS
8/18/2021	Armstrong Pump fr Niobrara River	0	CFS
9/17/2021	Armstrong Pump fr Niobrara River	0	CFS
10/25/2021	Armstrong Pump fr Niobrara River	0	CFS
6/24/2021	Beaver Pump fr White River	0	CFS
6/24/2021	Blust Pump fr White River	0	CFS
11/23/2021	Boggy Creek below Wickersham Diversion	0	CFS
6/24/2021	Chasek Pump fr White River	0	CFS
6/24/2021	Chasek Pump fr Whitney Lake	0	CFS
6/24/2021	Circle Pump - Hollibaugh fr Niobrara River	0	CFS
1/28/2021	Cook Pump fr Niobrara River	0	CFS
2/23/2021	Cook Pump fr Niobrara River	0	CFS
3/30/2021	Cook Pump fr Niobrara River	0	CFS
4/15/2021	Cook Pump fr Niobrara River	0	CFS
5/19/2021	Cook Pump fr Niobrara River	0	CFS
6/10/2021	Cook Pump fr Niobrara River	0.52	CFS
6/14/2021	Cook Pump fr Niobrara River	0	CFS
7/8/2021	Cook Pump fr Niobrara River	1.53	CFS
8/16/2021	Cook Pump fr Niobrara River	0	CFS
9/15/2021	Cook Pump fr Niobrara River	0	CFS
10/21/2021	Cook Pump fr Niobrara River	0	CFS
4/2/2021	Delsing Pump fr Niobrara River	0	CFS
4/22/2021	Delsing Pump fr Niobrara River	0	CFS
5/27/2021	Delsing Pump fr Niobrara River	0	CFS
6/22/2021	Delsing Pump fr Niobrara River	1.05	CFS
7/20/2021	Delsing Pump fr Niobrara River	0	CFS
8/27/2021	Delsing Pump fr Niobrara River	0	CFS
9/29/2021	Delsing Pump fr Niobrara River	0	CFS
11/23/2021	Dry Boggy Creek at Hat Creek Rd	0	CFS
4/2/2021	Enterprise Pump fr Niobrara River	0	CFS
4/22/2021	Enterprise Pump fr Niobrara River	0	CFS
5/10/2021	Enterprise Pump fr Niobrara River	0	CFS

APPENDIX B 2021 FIELD MEASUREMENTS

Date	Site Name	Discharge/Volume	Unit
6/21/2021	Enterprise Pump fr Niobrara River	0	CFS
7/16/2021	Enterprise Pump fr Niobrara River	0	CFS
8/27/2021	Enterprise Pump fr Niobrara River	0	CFS
9/29/2021	Enterprise Pump fr Niobrara River	0	CFS
5/28/2021	Harris-Cooper Canal fr White River	0	CFS
11/23/2021	Hat Creek above Coffee Canal	3.38	CFS
11/23/2021	Jim Creek at Hat Creek Rd	0	CFS
7/21/2021	Johndreau Pump fr Niobrara River A-2555	0	CFS
7/21/2021	Johndreau Pump fr Niobrara River A-2654R	0	CFS
5/27/2021	Lichte Canal from Niobrara River	0	CFS
6/23/2021	Lichte Canal from Niobrara River	0	CFS
8/26/2021	Lichte Canal from Niobrara River	0	CFS
9/30/2021	Lichte Canal from Niobrara River	0	CFS
7/19/2021	Long Branch Creek near Ardmore, South Dakota	0	CFS
5/27/2021	Montague Canal from Niobrara River	0	CFS
6/23/2021	Montague Canal from Niobrara River	0	CFS
8/26/2021	Montague Canal from Niobrara River	0	CFS
9/30/2021	Montague Canal from Niobrara River	0	CFS
5/27/2021	Montague Canal Pump fr Niobrara River	0	CFS
6/23/2021	Montague Canal Pump fr Niobrara River	1.6	CFS
8/26/2021	Montague Canal Pump fr Niobrara River	0	CFS
9/30/2021	Montague Canal Pump fr Niobrara River	0	CFS
8/17/2021	Niobrara River at Pink School House Rd	0.1	CFS
11/23/2021	Sow Belly Creek above Zimmerman Canal	3.89	CFS
7/6/2021	Squaw Creek near Montrose (Pants Butte Rd)	0	CFS
11/23/2021	Squaw Creek near Montrose (Pants Butte Rd)	0	CFS
7/6/2021	Warbonnet Creek at Pants Butte Rd	0	CFS
11/23/2021	Warbonnet Creek at Pants Butte Rd	1.33	CFS
3/11/2021	Whitney Reservoir	5545	AF
5/28/2021	Whitney Reservoir	7150	AF
6/24/2021	Whitney Reservoir	5920	AF
8/30/2021	Whitney Reservoir	1448	AF
12/29/2021	Whitney Reservoir	2880	AF
3/23/2021	Wilkins Pump fr Niobrara River	0	CFS
4/2/2021	Wilkins Pump fr Niobrara River	0	CFS
4/22/2021	Wilkins Pump fr Niobrara River	0	CFS
6/21/2021	Wilkins Pump fr Niobrara River	0	CFS
7/16/2021	Wilkins Pump fr Niobrara River	0	CFS
8/27/2021	Wilkins Pump fr Niobrara River	0	CFS
9/29/2021	Wilkins Pump fr Niobrara River	0	CFS

APPENDIX C

NEBRASKA ADMINISTRATIVE CODE

Title 457 - DEPARTMENT OF NATURAL RESOURCES RULES FOR SURFACE WATER

Chapter 23 - MORATORIUM AREA VARIANCES FOR SURFACE WATER APPROPRIATIONS

001 PETITION FOR LEAVE TO FILE OR CONSIDER AN APPLICATION. Any person wanting to apply for a new surface water appropriation within a moratorium or stay area must file a petition in the Department requesting leave to file an application. The petition must be accompanied by a copy of the completed proposed application. The application shall not be considered filed at the time it is submitted with the petition. Anyone who currently has an unapproved application on file in the Department for a new appropriation for a project that is within a moratorium or stay area must file a petition requesting a variance to the moratorium or stay. The fee for filing the petitions shall be that described in § 33-105(8) R.R.S. 1943, as amended.

The petition shall include sufficient information to indicate:

001.01 The proposed project is for a non-consumptive use; or

001.02 The applicant has a credible proposal for replacing any consumptive use that will occur in a manner such that the project will not harm other users; or

001.03 The applicant has credible information that indicates there **may be** unappropriated water available at the proposed location at the time the depletion is likely to occur; or

001.04 The project existed prior to any informal moratorium, formal moratorium or stay.

001.05 There is a public safety issue that must be addressed and the proposed project addresses such issue.

001.06 The proposed use is a temporary use for public construction and the total volume requested is less than ten (10) acre-feet.

002 REVIEW. The Department shall review the information provided with the petition and shall make a determination as to whether it is sufficient to indicate good cause for allowing further consideration of the application.

003 DECISION. A written decision shall be issued. The decision shall either deny the petition and state the reasons for such denial, or grant the petition and state either (a) the

petitioner may file the application and supporting documentation, or (b) the Department will proceed to process the existing filed application. Any decision approving a petition shall not bind the Director to approve any application to which it relates, or in any way be used as evidence of prejudice for the Director's future decisions concerning the specific approval requirements of such application. Allowance of a leave to file does not negate the necessity to meet the specific approval requirements for an appropriation.

004 APPEAL. If the petitioner wishes to appeal the decision of the Department, he or she may request a hearing before the Department within 15 days of the date the decision is rendered in accordance with the Department's Rules of Practice and Procedure, Title 454.